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Assessing The Usefulness of Publications by Agricultural Economists Through Citations

by

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Most of us doing research speculate occasionally on the usefulness of our publications. Unfortunately, public or private support for our research, peer review, and acceptance of research results for publication are only partial measures of the worth of our literature. Yet, universities stress the volume of publications as criteria for promotion, tenure, salary increases, and reimbursement for attending meetings. Given this emphasis on publishing, it is not surprising that page counts in the AJAE have been often used to rank departments of agricultural economics (e.g., Holland and Redman, Simpson and Steele).

There are several limitations, nevertheless, to using page counts in the AJAE as measures of research productivity. The first is that agricultural economics is a broad field and many of our research publications are better suited for journals or communication media other than the AJAE. A second problem is that page counts measure only the supply side of information distribution, and it is not clear if these counts relate closely to usefulness of our research--the demand side. A third problem is that page counts are an historical indication of research productivity. They show the ability of individuals and departments to publish in the past. Counts used to rank departments include publications by people who have retired, those who have moved to greener pastures, and those who have allowed laurels to adhere to their posteriors. Also, departments that have recently lost or gained productive people may be over- or under-ranked by

page counts. While prior department productivity should be a point of pride, it is even more useful to know current and future productivity.

In this article I cover the strengths and weaknesses of citations as measures of the usefulness of publications done by the current faculty in 26 U.S. departments of agricultural economics. I also discuss how citations might be employed to evaluate individuals and departments, and then discuss how citations might be used to evaluate articles or journals. I conclude by suggesting that citations provide valuable insights into the usefulness of publications, that they are stronger measures of research productivity than page counts, and that the small number of citations to publications by agricultural economists may show we ought to adjust our publishing habits.

Data Used

My analysis is limited to 755 economists who are on the faculties of 26 of the largest departments of agricultural economics in the U.S. These units produce most of the Ph.Ds in our profession, rank high in page counts in the AJAE, and do a large part of the university-based research in the U.S. I apologize to other excellent departments of agricultural economics that were excluded from the study and to the large number of productive agricultural economists who are not affiliated with universities in the U.S., and were, thus, ignored by my analysis.

To further limit the study, I asked the heads or chairmen of the 26 selected departments to provide a list of individuals who would be on their faculties as of October 1, 1985 and who were expected to publish as a part of their duties. I asked them to delete individuals who were emeritus faculty, those who did not consider themselves agricultural economists,

those with only nominal appointments in the department, and those in administrative positions or on leave and not expected to return to research. The final selection of those included was left to the chairman-head. Some of them excluded people who were full-time extension and those who did most of their work outside of agricultural economics, while other chairmen and heads included virtually everyone who had an appointment in their department. Because of these differences one must be cautious in calculating average number of citations per faculty member.

Citation information was tabulated manually from the Social Science Citation Index (SSCI) for the years 1966 to 1984. The Index was compiled largely from citations in social science journals. The journals surveyed include the AJAE, Land Economics, Economic Development and Cultural Change, Rural Sociology, and most general economics journals. Some of the journals not covered by the Index include the Southern Journal of Agricultural Economics, the Canadian Journal of Agricultural Economics and other regional journals of agricultural economics. The Index records citations mentioned in "citing journals", but the citation may be to an article, book, unpublished manuscript, or personal communication. The materials cited, therefore, may be outside of the surveyed journals. For example, the AJAE, a surveyed journal, may contain a citation to an article in the Southern Journal of Agricultural Economics. This citation would be included in the Index even though the Southern Journal of Agricultural Economics is not a journal surveyed by the SSCI.

The Index is compiled by the Institute for Scientific Information (ISI) which first published the Science Citation Index (SCI) in 1963 (Garfield, 1979). In the early 1970s ISI began to publish the SSCI that initially covered 1,152 social science journals. In 1984, SSCI covered

1,445 of the most often cited social science journals, while SCI compiled citations from 3,208 prominent science journals. Citations to social science articles found in science journals are cross referenced in SSCI. Thus, in 1984, the SSCI presented information on all citations found in the completely covered social science journals and also some information from the partially covered social science journals. SSCI currently covers the period 1966 to date and is available in machine readable form or in hard copy in most major libraries.

How is SSCI compiled? The 1984 SSCI, for example, includes all issues of the 1,445 social science journals received by ISI during the twelve months of February 1984 through January 1985. The journals covered by the Index are determined by a review board. Their judgement on what to include is largely based on the frequency of citations to articles in that journal by authors publishing in other journals covered by the Index. Each issue of the covered journal is perused by a data processor who extracts citations made in the footnotes, in the list of references or bibliographies, and in the body of the text of the article. References in virtually all of the articles, notes, comments, and book reviews presented in the journal are swept up in the Index. Computers are used to arrange the citations into three formats: alphabetically by name of cited author, alphabetically by the document cited, and alphabetically by the geographic location of the author cited.

The SSCI presents three pieces of information of interest to agricultural economists: (1) the number of citations to an individual's work, (2) by whom and where the work was cited, and (3) a ranking of journals by the frequency their articles are cited by surveyed journals.

Limitations of Citation Counts

For the most part citations are professional accolades. By custom, few of the citations by agricultural economists are negative: citing an item to point out errors or shortcomings. Most weak or incorrect work is ignored. Citations are largely intra-professional kudos and show the extent to which other writers find one's work stimulating, useful, provocative, or path-breaking. Understandably, the smaller the profession or circle of people interested in a given subject, the fewer the number of citations. Also, those who are first with an idea in the literature tend to be cited more often than people who do later work on the topic.

Citations do not show the usefulness of one's work when the user of the publication seldom writes professional publications: e.g., policy-makers, farmers, heads of agro-industries, and students. One may do research that is useful for the nursery industry, for example, have a major impact on the efficiency of that industry, and never receive a single citation in the professional literature because the users of the research produce plants, not publications with citations. Likewise, a piece of research or advice may be important in shaping legislation that affects thousands of farmers, yet the provider of this information may not be cited because policymakers write laws rather than articles with citations. Excellence in teaching, extension, or administration is likewise not reflected in citations.

Several additional limitations of citation information are worth noting: (1) When there are multiple authors of an article cited, only the first author is listed in the Index. Those authors who generally place the names of graduate students or other colleagues first on articles, and

seldom publish alone, are under-reported in the citation data. (2) As mentioned earlier, the SSCI does not cover all of the journals where agricultural economists regularly publish, and it has more extensive coverage of citations in general economics journals, development journals, and statistical journals. Likewise, it does not assemble citations made in experiment-station bulletins, theses, most books, and extension publications. (3) Because of major differences in citation styles across journals, citations to one individual's publications may occur in several places in the Index. For example, citations may be found under the listing of Truman, HS, Truman, H, or simply under Truman, depending on how the original citing author presents the citation. (4) Any errors in spelling introduced by the citing author are carried forward into the Index along with keying errors by the operator recording the citations. (5) Only the the last name and initials are used in the Index to identify the author of the publication cited. This results in homograph problems when several cited authors have the same last name and initials. Homographs are an even more severe problem when the citation gives only one or no initial. This hampers doing citation counts by machine. (6) The Index includes all citations in the articles covered, including self-citations. Since 10-20 percent of most citations are self-citations, these must be deleted to measure the usefulness of publications to others besides the original author(s). Accordingly, I deleted self-citations from my count.

There are several uses that might be made of SSCI information by agricultural economists. One is to evaluate (and possibly rank) research output by departments or individuals, and another is to measure the usefulness of research publications (Garfield, 1972, 1982, and 1983). Evaluative questions such as the following may be addressed by using citations: Which

faculties of agricultural economics rank highest in terms of total number of citations to their work? Which individuals in our profession are the most widely cited? Who are the young agricultural economists receiving the most attention via citations from others in the profession? And, how widely cited are AJAE articles?

Departmental Rankings

Table 1 shows the ranking of the 26 departments surveyed according to total number of citations garnered by their current faculty from 1966 to 1984. The University of California at Berkeley ranks number one, followed by Minnesota, the Food Research Institute at Stanford, Wisconsin, and Cornell. Comparing this citation ranking with the ranking recently provided by Simpson and Steele, based on total page count and per capita page count in the AJAE, shows sharp differences. Based on total page count in the AJAE over 1973-83, for example, Oklahoma State, Iowa State, Texas A & M, and Purdue rank high, but are in the middle of the pack when it comes to citation count. At the other extreme, Cornell and Ohio State rank relatively low in total page count, but much higher in terms of total citations to publications by their faculties. Using the per capita (research and teaching faculty) page count ranking also shows marked contrasts with the citation ranking. V.P.I, North Carolina State, Purdue, Iowa State, and Oklahoma State rank high on the per capita pages of publication in the AJAE, but low in terms of the total number of citations to their works.

The previously discussed limitations of page counts may explain part of these differences in rankings. In addition, some individuals and departments may generate a large number of pages in the AJAE, yet have few people cite their work.

TABLE 1. Ranking of 26 Departments by Total Number of Citations, 1966-84 and AJAE Page Counts, 1973-83

Ranking of Universities by Total Citations	No. of Faculty Surveyed	No. of Citations 1966-84[1/]	Total Page Count AJAE 1973-83[2/] No. Pages	Rank	Rank by Per Capita Page Count 1980-83[2/]
1. California-B	16	2,460[3/]	313	8	1
2. Minnesota	46	1,258	330	7	8
3. Stanford	9	1,068	N/C	-	-
4. Wisconsin	29	872	348	5	15
5. Cornell	38	827	251	11	13
6. California-D	33	787	355	4	7
7. Michigan State	32	742	214	13	12
8. Illinois	31	688	287	9	10
9. Maryland	20	658[3/]	N/C	-	-
10. Chicago	2	591	N/C	-	-
11. Ohio State	34	552	109	22	25
12. Oklahoma State	30	538	335	6	2
13. Iowa State	24	443	385	1	4
14. Texas A & M	44	405	372	2	9
15. Florida	39	367	224	12	11
16. Purdue	46	340	358	3	6
17. N. Carolina State	32	338	286	10	3
18. Missouri	28	323	141	15	22
19. Arizona	19	302	117	21	21
20. Washington State	28	279	169	14	17
21. Penn State	36	273	121	20	24
22. Kansas State	17	252	43	23	28
23. Oregon State	26	232	123	19	19
24. Georgia	39	168	135	16	16
25. Kentucky	30	159	124	18	18
26. VPI	26	153	131	17	5

1/ Tabulated from the Social Science Citation Index volumes covering 1966-1984.

2/ Adapted from James R. Simpson and John T. Steele, "Institutional Affiliation of Contributors to the American Journal of Agricultural Economics, 1973-83", Am. J. of Ag. Econ. 67(1985):326.

3/ Includes a count for Richard Just of 202 citations. Both California-B and Maryland claimed him as a faculty member as of October 1, 1985.

Citation information may also be useful in showing which departments are on up- or down-escalators regarding their research productivity and recognition. Citations to current staff in a department are a more accurate indication of the current and future capacity to do quality research than are page counts. As mentioned before, page count show the history, not the future of a department. Because I tabulated citations garnered by current faculty, and not the number of citations assembled by a previous faculty that may have changed membership substantially over time, I cannot compare number of citations for a current faculty with total citations of a previous faculty. A useful proxy for the past grandeur of a department, however, is the number of its graduates hired by other prominent departments of agricultural economics.

In Table 2, the 26 departments are ranked by the number of graduates they placed, by late 1985, at one of the other 25 universities surveyed. The count excludes individuals who are working at the university where they received their last degree, and considers only the last degree earned. In doing this ranking, I assume that when one university hires the graduate of another university it is a positive vote for the quality of the graduate research program at the training university. As can be noted, Michigan and Iowa State stand at the top of the list--by a wide margin--in the number of their graduates who work at one of the other surveyed universities.

If this ranking is a valid measure of past research productivity of a department, and if citations are a suitable measure of the usefulness of current staffs' research, then several conclusions can be drawn about which departments have risen or fallen in ranking over the past several decades. Also, removing those individuals who have 30 or more, or 25 or more, years

of professional experience shows how sensitive the department ranking based on citations might be to retirements in the near and more distant future.

The third column in Table 2 shows the rank of each of the universities in terms of the total number of citations garnered by their current faculty. The fourth column gives the departmental ranking based on the number of citations garnered by faculty who have less than 30 years of professional service. The assumption here is that individuals with 30 or more years of professional service are nearing retirement and that their citation pool will soon be removed from the department, say over the next 5 years. Column 5 presents similar information but excludes citations for all those who have 25 or more years since their last degree. Many of these individuals will retire from their current universities in the next 10 years.

Assuming that newly hired faculty will make only small initial contributions to a department's bank of citations, and ignoring people in mid-career who might switch universities, major changes will occur in the next few years in the citation ranking of the departments surveyed. Column 6 of Table 2 shows the change in the number of positions in rank from column one to column five. That is, the number of positions a department rises or falls, from the ranking based on graduates placed, when re-ranked by total citations held by current members of the faculty who have less than 25 years of professional experience. The departments that decline most in ranking are Chicago, Iowa State, Michigan State, Purdue, Missouri, and Oregon State. The big gainers are Maryland, the Food Research Institute at Stanford, Ohio State, Texas A & M, and Florida. Two special cases should be noted: the University of Chicago drops because all of its agricultural economists will likely be retired within the next 10 years, and the

TABLE 2. Departments Ranked by Number of Their Graduates Hired by Other 25 Departments, and Ranked by Total Citations

(1)	(2)	(3)	(4)	(5)	(6)
University	No of its Graduates Hired by Other 25	Rank Based on Current Citations	Rank Based on No. Citations <30 Pro Years	Rank Based on No. Citations <25 Pro Years	Change in Rank (1-5)=6
1. Michigan State	70	7	11	12	-11
2. Iowa State	60	13	16	13	-11
3. Wisconsin	38	4	6	4	-1
4. Minnesota	36	2	8	5	-1
5. California-B	36	1	1*	1*	+4
6. Illinois	30	8	7	8	-2
7. Cornell	30	5	2	9	-2
8. Purdue	28	16	19	17	-9
9. California-D	24	6	4	10	-1
10. Chicago	22	10	26	26	-16
11. Oklahoma State	21	12	10	7	+4
12. N. Carolina State	18	17	14	18	-6
13. Washington State	17	20	18	14	-1
14. Missouri	15	18	15	23	-8
15. Ohio State	15	11	9	6	+9
16. Penn State	15	21	17	15	+1
17. Oregon State	14	23	24	24	-7
18. Stanford	12	3	3	2	+16
19. Texas A & M	11	14	13	11	+8
20. VPI	10	26	21	20	0
21. Kentucky	4	25	25	25	-4
22. Kansas State	4	22	20	19	+3
23. Maryland	4	9	5	3	+20
24. Florida	3	15	12	16	+8
25. Georgia	3	24	23	22	+3
26. Arizona	0	19	22	21	+3

*Also deletes Richard Just's 202 citations.

University of California Berkelev remains number one, but bv a much narrower margin, in terms of current citation rank, near-future rank, and in the longer-run rank.

Individual Rankings

I was surprised by the extent of citation concentration. As shown in Table 3, only 10 percent of the individuals surveyed had over two-thirds of the total citations garnered. At the same time, half of the individuals had four citations or less to their credit; one-quarter of the economists surveyed had no citations--even to their dissertation! I was also surprised to find that only 31 people, or four percent, had more than 100 citations in their career. By way of comparison, a dozen political scientists had more citations over 1970-79 than did any agricultural economist over twice as many years (Robey). The typical pattern is for a small number of people in an agricultural economics department to have most of the citations and for a large majority of the members of a department to have very few or no citations to their publications. Surprisingly, several prominent departments had no individual with 100 or even 50 citations.

Table 4 presents a list of the 20 individuals surveyed who had the largest number of citations--the profession's citation stars! As can be noted, they tended to be people who published in general economics journals, focused on research methods, worked on development issues, or wrestled with policy problems. Aside from a small number of individuals, the stars were also people who have worked professionally for more than 20 years, and they tended to work on issues on the periphery of the traditional core of agricultural economics.

TABLE 3. Number of Citations bv Number of Individuals and Total Number of Citations, 1966-84

Number of Citations	Citations		Individuals	
	Total Number	%	Number	%
0	0	0	185	25
1-2	179	1	131	17
3-4	272	2	79	10
5-9	710	5	108	14
10-19	1285	9	96	13
20-49	2551	17	83	11
50-99	2870	19	42	6
100+	7009	47	31	4
Totals	14,876	100	755	100

TABLE 4. Twenty Individuals With Most Citations, 1966-84

Name	Current Univ.	Location Last Degree	Total Citations	Pro Years	Average Citations Per Year
Adelman, IG	California-B	California-B	1,287	30	42.90
Johnson, DG	Chicago	Iowa State	401	40	10.03
Johnston, BF	Stanford	Stanford	386	32	12.06
Ruttan, VW	Minnesota	Chicago	356	33	10.79
Tweeten, LG	Oklahoma State	Iowa State	320	23	13.91
Fisher, AC	California-B	Columbia	300	17	17.65
Hildreth, CG	Minnesota	Iowa State	289	38	7.61
Mueller, WF	Wisconsin	Vanderbilt	257	30	8.57
Yotopoulos, PA	Stanford	UCLA	244	23	10.61
Just, RE	*	California-B	202	14	14.43
Johnson, GL	Michigan State	Chicago	199	36	5.53
Tolley, GS	Chicago	Chicago	190	30	6.33
Gardner, BL	Maryland	Chicago	178	17	10.12
Norman, DW	Kansas State	Oregon State	163	19	8.58
DeJanvry, A	California-B	California-B	162	19	8.53
Randall, A	Ohio State	Oregon State	160	15	10.67
Ladd, GW	Iowa State	Illinois	152	30	5.07
Tomek, WG	Cornell	Minnesota	147	24	6.13
Dovring, F	Illinois	Sweden	144	26	5.54
Peterson, WL	Minnesota	Chicago	143	19	7.53

*Claimed by both Maryland and California-B as October 1, 1985.

Because the number of citations one receives is related to the number of years in the profession, it is also instructive to look at the average number of citations received per year of professional work (pro years). The top twenty individuals in the profession, in terms of average number of citations per professional year, are presented in Table 5. Using this criteria adds several younger people to the star category: Gladwin, Leuthold, McConnell, Rausser, and Schmitz.

Occasionally, organizations scan the profession looking for individuals in mid-career to lead a department, to fill an endowed chair, to provide leadership to a research program, or to fill other leadership roles. Citations may be a valuable piece of information for those making these decisions. The 25 individuals shown in Table 6 are all those who have been in the profession 15 or less years and have 30 or more citations. It is interesting to note that several individuals on the list are already chairman-heads, have recently switched universities, or have interviewed for positions elsewhere and bargained for higher salaries at their university.

As an aside, the four current chairmen-heads with the largest number of citations are Rausser, Falcon, Kalter, and Bromley. It is probably not coincidental that these individuals lead 4 of the top 5 citation-ranked departments.

Table 7 shows citation information for eleven people with 10 years or less in the profession and having 20 or more citations to their credit. It will be interesting to see if these individuals are tempted to change positions in the next few years, or if they are rewarded with higher than average pay raises.

TABLE 5. Twenty Individuals With Highest Number of Citations Per Profession Year, 1966-84

Name	Current Univ.	Location Last Degree	Total Citations	Pro Years	Average Citations Per Year
Adelman, IG	California-B	California-B	1287	30	42.90
Fisher, AC	California-B	Columbia	300	17	17.65
Just, RE	*	California-B	202	14	14.43
Tweeten, LG	Oklahoma State	Iowa State	320	23	13.91
Johnston, BF	Stanford	Stanford	386	32	12.06
Ruttan, VW	Minnesota	Chicago	356	33	10.79
Randall, A	Ohio State	Oregon State	160	15	10.67
Yotopoulos, PA	Stanford	UCLA	244	23	10.61
Gardner, BL	Maryland	Chicago	178	17	10.12
Johnson, DG	Chicago	Iowa State	401	40	10.03
Rausser, GC	California-B	California-D	138	14	9.86
Gladwin, CH	Florida	Stanford	57	6	9.50
Norman, DW	Kansas State	Oregon State	163	19	8.58
Mueller, WF	Wisconsin	Vanderbilt	257	30	8.57
DeJanvry, A	California-B	California-B	162	19	8.53
Schmitz, A	California-B	Wisconsin	130	17	7.65
McConnell, KE	Maryland	Maryland	96	12	8.00
Hildreth, CG	Minnesota	Iowa State	289	38	7.61
Peterson, WL	Minnesota	Chicago	143	19	7.53
Leuthold, RM	Illinois	Wisconsin	108	16	6.75

*Claimed by both Maryland and California-B as of October 1, 1985.

TABLE 6. Individuals With 15 or Less Professional Years and 30 or More Citations

Name	Current Univ.	Location Last Degree	Total Citations	Pro Years	Average
Ayer, HW	Arizona	Purdue	38	15	2.53
Bishop, RC	Wisconsin	California-B	88	14	6.29
Boehije, MD	Minnesota	Purdue	40	14	2.86
Doeksen, GA	Oklahoma State	Oklahoma State	49	14	3.50
Ervin, DE	Missouri	Oregon State	39	11	3.55
Fairfax, SK	California-B	N. Carolina State	39	11	3.55
Gladwin, CH	Florida	Stanford	57	6	9.50
Griffin, WL	Texas A & M	Oregon State	30	13	2.31
Hueth, DL	Maryland	California-B	62	11	5.64
Huffman, WE	Iowa State	Chicago	77	13	5.92
Just, RE	*	California-B	202	14	14.43
McCarl, B	Texas A & M	Penn State	48	12	4.00
McConnell, KE	Maryland	Maryland	96	12	8.00
Mount, TD	Cornell	California-B	46	15	3.07
Norgaard, RB	California-B	Chicago	42	14	3.00
Patrick, GF	Purdue	Purdue	44	15	2.93
Peck, AE	Stanford	Stanford	78	12	6.50
Perloff, JM	California-B	M.I.T.	37	9	4.11
Randall, A	Ohio State	Oregon State	160	15	10.67
Rausser, GC	California-B	California-D	138	14	9.86
Robinson, S	California-B	Harvard	76	15	5.07
Taylor, CR	Illinois	Missouri	43	10	4.30
Tyner, WE	Purdue	Maryland	32	8	4.00
Ward, RW	Florida	Iowa State	58	15	3.87
White, FC	Georgia	Oklahoma State	30	14	2.14

*Claimed by both Maryland and California-B as of October 1, 1985.

TABLE 7. Individuals With 10 or Less Professional Years and 20 or More Citations

Name	Current Univ.	Location Last Degree	Total Citations	Pro Years	Average
Abbott, PC	Purdue	MIT	23	9	2.56
Berck, P	California-B	MIT	26	9	2.89
Bredahl, ME	Missouri	Minnesota	29	10	2.90
Chambers, RG	Maryland	California-B	27	7	3.86
Gladwin, CH	Florida	Stanford	57	6	9.50
Gonzalez-Vega, C	Ohio State	Stanford	22	9	2.44
Johnson, MB	Wisconsin	Syracuse	22	9	2.44
Perloff, JM	California-B	MIT	37	9	4.11
Taylor, CR	Illinois	Missouri	43	10	4.30
Tyner, WE	Purdue	Maryland	32	8	4.00
Wade, JC	Arizona	Iowa State	21	10	2.10

Evaluating the AJAE

Citation data also show the uses made of publications and journals. In Table 8, I summarize interesting information about the AJAE that has been published annually since 1977 by ISI in its Journal Citation Reports. The reports document the number of citations found in individual journals covered by SSCI (such as AJAE), the major sources of these citations, the number of citations made to individual journals (covered by SSCI), and the primary sources that contain these citations. With this information one can determine which journals or other sources provide the bulk of the citations used by authors publishing in the AJAE. Also, the data can be used to show which journals contain citations to articles in the AJAE. In short, this shows us who we cite, and who cites the AJAE.

As can be noted in line 1 of Table 8, each volume of the AJAE since 1977 has had between 1,577 and 1,977 citations. Of these citations, 15-19 percent were to earlier AJAE or JFE articles, 10-20 percent were to general economics or research methods journals, 4-8 percent were to other applied social science journals, and 56-70 percent of the citations were to other non-specified sources. The sharp increase in AJAE citations to general economics and research methods journals since 1977, and the large proportion of non-specified-source citations are interesting aspects of this information. Does this indicate that the AJAE is publishing more articles that are theoretical and methods oriented than previously? Does it also show we are a broad discipline and draw our material from a wide subject-matter base?

Line 2 of Table 8 shows that the annual total number of citation to articles in the AJAE ranged from 500 to 744 from 1977 to 1983. One-third to nearly half of these citations, however, were in the AJAE

TABLE 8. Various Measures of Citations In and To the AJAE, 1977-83

Item	Years			
	1977	1979	1981	1983
1. Total Number of Citations in AJAE	1768	1977	1863	1577
1a. To JFE or AJAE	15%	17%	19%	18%
1b. To Economics and Methods Journals	10%	16%	15%	20%
1c. To Ag. Econ. Related Journals	5%	8%	4%	6%
1d. To All Others Not Specified	70%	59%	62%	56%
2. Total Number of Citations to AJAE	500	679	731	744
2a. In AJAE	49%	42%	43%	34%
2b. In Economics and Methods Journals	4%	2%	3%	4%
2c. In Ag. Econ. Related Journals	22%	30%	34%	41%
2d. In All Others Not Specified	25%	26%	20%	21%
3. Rank of AJAE in terms of times cited[1/]	151	111	108	119
4. Half-life of citations to AJAE items	N/C	4.7	5.2	5.7
5. Impact factor	.573	.637	.651	.424

Source: Institute for Scientific Information, Social Science Citation Index: Journal Citation Reports various years 1977-83.

1/ Rank out of more than 1,000 social science journals.

itself--self-citation as far as the discipline was concerned. Only 2-4 percent of the citations to AJAE pieces were found in general economics or research methods journals, 22-41 percent were in other specified social science journals, and 20-26 percent were in other non-specified journals. From this, I conclude that AJAE pieces do not appeal to a large citing audience, and that we are largely talking to each other.

Three other bits of information are presented in Table 8. Line 3 shows the rank of AJAE in terms of number of times its pieces are cited in surveyed journals. It has ranked from a high of 108th in 1981 to a low of 151st in 1977 out of more than a thousand social science journals surveyed. While this places the AJAE in the first or second decile in terms of total number of citations, many of these citations are the AJAE citing the AJAE; most general economics journals rank much higher. Also, many social science journals receive very vew citations.

Line four in Table 8 shows the half life of citations to the AJAE. That is, the number of years after publication that account for 50 percent of the citations received by the cited journal. This half life has increased slightly from 4.7 to 5.7 years over 1979 to 1983. Line 5 of the table shows the impact factor for the AJAE. The impact factor is calculated by dividing the total number of citations to the AJAE in a given year by the number of citable items in AJAE. This factor ranged from a low of .424 in 1983 to a high of .637 in 1979. Said another way, an average piece in AJAE only receives about one-half of a citation each year! Does this mean that few pieces in the AJAE are cited?

To probe this issue I tabulated the citations over 1976-1980 to all articles, notes, comments, and book reviews included in the 1975 volume of the AJAE. Sixty percent of these items did not receive a single citation

by others during the five years following 1975! Another 15 percent of the articles in this volume received only one citation over this period. Since the citation half life of articles in the AJAE is 5-6 years, it is unlikely that this disappointing number of items cited would change much had I covered a longer time period. It appears that a large part of what we publish in AJAE is ignored by citing authors! We should be cautious, therefore, in assuming that the supply of our publications is a proxy for their usefulness.

Other Uses

In addition to assessing the citation productivity of departments, individuals, and publications, other uses can be made of citation indexes. One is to look at citations in constructing bibliographies on a given subject. Because of citing customs, citations mostly connect authors who have similar views and who are working on similar topics. Thus, by using citation indexes, one can quickly determine names of additional people with similar interests to some known author. If one assumes that most citing authors are conscientious and sift out only the best works to cite, then using citations to build bibliographies is a quick way of sorting wheat from chaff. For this reason it might be appropriate for instructors of research methods courses to introduce students to citation indexes.

Another use of citations is to study the history and sociology of our field. Leaders, disciples, and clusters of agricultural economists can be identified by using co-citation techniques (Small). One can also track how an idea or technique perculates through the profession by using citations.

Still another use of citation information by agricultural economists might be to study citation customs and ethics in the profession. As

citation analysis becomes more important in the evaluation of our work, and helpful in doing our research, we may find it useful to study, improve, and standardize our citation practices. We have an poorly defined citation code in the profession. Thou-shalt-not-quote-without-citing is about the only rule that is generally applied.

Conclusions

Measuring only the supply of publications authored by agricultural economists, and the growing number of journals that are major outlets for our craft, might lead one to conclude we are highly productive researchers. Looking at the small number of our publications that are cited, the large number of agricultural economist who are seldom cited, the large proportion of intra-professional citations, and the small overall number of citations to our work, might lead to less favorable conclusions.

Like any measure of performance, citation counts have their limitations. Nevertheless, if one is attempting to justify his or her existence by research output, it is useful to look at citations. They measure the extent to which other researchers find one's publications useful, they are a proxy for overall usefulness of our research, and they provide valuable information on the demand for our research publications. In my opinion, they are a better measure of the usefulness of our research than are page counts. Despite incentives that propel us to publish, we must periodically ask ourselves: Are we publishing something that is useful to a significant number of people?

Agricultural economists should attempt to increase the number of citations, by others, to their publications--especially articles in the AJAE. Answering some of the following questions might aid our quest for

more recognition. Are we publishing too many articles that are the "least-publishable-unit"-- fragments of our research activities--rather than writing fewer articles that are more comprehensive and interesting (Broad)? Should we write more books and fewer articles? Are too many of us working on topics that are overly narrow. Do too many of our publications only slightly modify the work of others? Would we increase citations to our work by those outside our profession if we published more articles in the AJAE that addressed national policy issues: e.g., the economics of food aid, the costs of farm programs, how to stimulate agricultural exports, and the implications of the farm debt crisis on the US economy? Would those outside our discipline find AJAE articles more interesting if they contained fewer derivatives, integrals, and models and more alliterations, similes, and active voice? Should a larger part of our research be reported in communication media reaching more readers than our agricultural economics journals: e.g.,the Wall Street Journal, the New York Times, and The Atlantic Monthly? Should we adjust professional incentives so that emphasis is placed on writing something for a relatively large audience, rather than stressing number of publications? Finally, do we simply write too much?

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